September 22, 2016

REMEDIAL INVESTIGATION / FEASIBILITY STUDY

Progress Report #6 — August 2016

Prepared for

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1.0 INTRODUCTION

This Progress Report (Report) presents a summary of activities completed during the period of August 2016, on behalf of Columbia Falls Aluminum Company, LLC (CFAC), for the Remedial Investigation / Feasibility Study (RI/FS) being performed at the Anaconda Aluminum Co. Columbia Falls Reduction Plant (a/k/a Columbia Falls Aluminum Plant) generally located near Columbia Falls in Flathead County, Montana ("Site"). The RI/FS is being conducted pursuant to the Administrative Settlement Agreement and Order on Consent (AOC) dated November 30, 2015 between CFAC and the United States Environmental Protection Agency (USEPA) (CERCLA Docket No. 08-2016-0002).

This Report provides a description of the actions that have been taken to comply with the AOC during the reporting period and describes work planned for the upcoming reporting period, including an updated project schedule as Appendix A. This report also provides updates regarding the availability of any new, validated sampling data received by CFAC during the reporting period. Lastly, this Report provides an update on any scope revisions and/or project delays encountered and solutions implemented to address any changes.

2.0 WORK COMPLETED

This Section provides a summary of activities completed or ongoing in August 2016.

2.1 Phase I Site Characterization Drilling and Soil Sampling Scope of Work

Drilling of soil borings, installation of monitoring wells, and soil sampling activities associated with the Phase I Site Characterization scope of work continued throughout August. The remainder of this section summarizes the drilling and sampling work completed between August 1, 2016 and August 31, 2016 and throughout the Phase I Site Characterization field activities. All drilling locations, sample intervals and selected analyses were in accordance with the RI/FS Work Plan, Phase I Sampling and Analysis Plan, SAP Addendum, and subsequent SAP Modifications.

2.1.1 Monitoring Well Installation

Cascade Drilling installed six (6) monitoring wells during August 2016. As of August 31, 2016, the Phase I Site Characterization monitoring well installation scope of work is complete. A total of 44 new monitoring wells were installed as part of the Phase I Site Characterization. Table 1 provides a summary of the monitoring wells installed.

Each monitoring well was installed utilizing rotosonic drilling methods to advance casing and collect core samples for geologic logging and laboratory analysis. Sampling associated with the completion of each boring is provided in Table 2. In the process of sonic coring, the holes were temporarily cased with a 6-inch nominal, inner diameter casing. In deep monitoring well locations, where unique geological layers that could serve as potential confining units were encountered beneath the water table during drilling, double-casing was used to hydraulically isolate monitoring wells screened within different layers, thereby minimizing any potential for cross contamination.

Monitoring well riser and screen were placed down the open hole and a sand filter pack was placed around the screen. The annulus above the filter pack was sealed with a bentonite seal. Monitoring well casings were constructed of 2-inch diameter Schedule 40 polyvinyl chloride (PVC). Monitoring well screens were constructed of 2-inch diameter, machine slot schedule 40 PVC, with screen slot size of 0.020 and were flush-threaded onto the casings. Surface completion of each well consisted of a protective stick-up enclosure, a locking J-plug and an

exterior lockable metal cover. Final boring logs for each monitoring well will be included in the Phase I Site Characterization Summary Report.

2.1.2 Monitoring Well Development

The Phase I Site Characterization monitoring well development activities were completed in August 2016. In total, forty-two (42) new monitoring wells and eighteen (18) existing monitoring wells were developed as part of the Phase I Site Characterization field activities. Two (2) new monitoring wells (CFMW-008a and CFMW-018) and two (2) existing monitoring wells (CFMW-017 and CFMW-025) were noted to be dry in August when development was attempted.

The wells were developed utilizing surge and pump methods. During pumping, Roux Associates field personnel monitored field parameters, including depth to water, flow rate, turbidity, pH, temperature, dissolved oxygen (DO), specific conductivity, and oxidation reduction potential (ORP). Wells were developed until the turbidity reached a value of 10 Nephelometric Turbidity Units (NTUs) or for a minimum of two hours, which ever occurred first. Field forms from development will be provided in the Phase I Site Characterization Summary Report.

2.1.3 Borrow Pit Area Test Pitting

Seven (7) test pits were completed to approximately 12 ft-bls within the Borrow Pit Area during August 2016. The test pits were completed utilizing an excavator operated by a subcontractor to Cascade Drilling under the oversight of Roux Associates personnel. The test pits were completed and soil samples were collected from each test pit location in accordance with SAP Modification #6 (described below in Section 2.6).

2.1.4 Soil Borings

In August 2016, the final two soil borings proposed as part of the Phase I Site Characterization scope of work were completed in the South Percolation Ponds. As of August 31, 2016, the Phase I Site Characterization soil boring scope of work is complete. Soil borings were completed in accordance with the RI/FS Work Plan, Phase I Sampling and Analysis Plan, the SAP Addendum, and SAP modifications. Table 2 provides a summary of the soil borings completed through August 2016.

2.1.5 Soil Sampling

In August 2016, approximately 47 soil samples were collected by Roux Associates field personnel from monitoring well drilling locations, soil boring locations and the borrow pit area test pits. Soil sampling associated with the Phase I Site Characterization drilling scope of work is complete as of August 31, 2016. Table 2 provides a summary of the samples collected as part of the Phase I Site Characterization through August 2016. Sample intervals and selected analyses were in accordance with the RI/FS Work Plan, Phase I Sampling and Analysis Plan, the SAP Addendum, and the SAP Modifications. Results of the soil sampling activities will be provided in the Phase I Summary Report.

2.2 Surveying and Monitoring Well Gauging

As requested by the USEPA during the project kickoff meeting held on April 5, 2016, and as described in the SAP Addendum, CFAC agreed to perform surveying and gauging of monitoring wells as the drilling program is ongoing. The purpose of the surveying and gauging activities is to perform a preliminary assessment of groundwater elevations and flow directions throughout the field program.

Sands Surveying was onsite on August 1 and August 28, 2016, to perform surveying at newly installed monitoring wells and existing monitoring wells. Survey data were collected in Montana State Plane and NAD83 Coordinate Systems. Final survey data for all monitoring wells are provided in Table 3.

Roux Associates field personnel performed a site-wide gauging event on August 30, 2016. Gauging data are provided in Table 4. Groundwater elevations collected on August 30, 2016 from water table monitoring wells were utilized to prepare a preliminary groundwater flow map for the Site, which is included as Plate 1.

2.3 Geophysical Surveying

As noted in previous progress reports, Shari Johnson Engineering was onsite on July 25 and 26, 2016 to complete a ground penetrating radar (GPR) survey as described in the SAP Addendum. Ten (10) GPR transects were completed across the various landfills including the West Landfill, Wet Scrubber Sludge Pond, Sanitary Landfill, Center Landfill and East Landfill.

In August 2016, Shari Johnson Engineering submitted a report summarizing the results of the GPR survey activities (Appendix B). The data summarized in the report will be utilized by CFAC and Roux Associates in conjunction with data collected during the Phase I Site Characterization when developing the Phase II Remedial Investigation scope of work and future remedial alternatives as part of the Feasibility Study.

2.4 Asbestos Landfill Test Pitting

Test pitting activities were completed on August 15 through August 18, 2016 at the North and South Asbestos landfills. Three to four test pits were completed in each landfill with the objective of confirming the presence, or lack thereof, of visually identifiable asbestos materials in each landfill. The test pitting was performed by Cascade Drilling under the oversight of Roux Associates personnel and an OSHA certified asbestos inspector provided by Hydrometrics. Figures 1 and 2 show the locations of the test pits and Table 5 provides a summary of the observations made by Roux Associates personnel during the test pitting activities. As shown on Figure 1, Test Pits TP-14 and TP-15 were completed north of the North Asbestos Site feature boundary. The locations for these test pits were selected based on Site reconnaissance observations indicating a disturbed land surface in this area.

2.5 Investigation Derived Waste Disposal

Investigation-derived waste (IDW) generated during the Phase I Site Characterization field activities are being managed in accordance with the Investigation Derived Waste (IDW) Management Plan dated May 9, 2016 and the AOC.

Waste characterization soil samples have been collected through the field program as soil IDW was generated. Sample results from the first five soil IDW waste characterization samples indicated that soils were non-hazardous. Roux Associates provided the five sample results to the USEPA on July 24, 2016 and to the Section Manager for Washington States Ecology's Waste 2 Resources Program on July 27, 2016. Disposal of soil IDW associated with the first five samples was completed in August 2016. Four, 25-yard soil containers were delivered to Waste Management Graham Road Recycling and Disposal, 1820 S. Graham Road Medical Lake, WA 99022. Transport of the containers was managed by Cascade Drilling.

Waste characterization sample results from the remaining soil IDW containers will be provided to the USEPA and Washington States Ecology's Waste 2 Resources Program for review in September 2016. Following review by both parties, Roux Associates and CFAC will schedule for disposal of the remaining soil IDW.

Groundwater and decontamination water IDW will continue to be generated through September as groundwater sampling activities are completed. Upon completion of sampling, Roux Associates personnel will collect water IDW samples from containers onsite and disposal of water will be coordinated in accordance with the IDW Management Plan and AOC.

2.6 Field Modifications

Three field modifications were submitted to USEPA in August 2016 summarizing changes to the SAP and SAP Addendum. The three field modifications are summarized below:

1. Modification #6 (August 23, 2016) – Seven (7) test pits to 12 feet below land surface will be completed to initially evaluate conditions within the Borrow Pit area.

2. Modification #7 (August 23, 2016) – Due to the presence of surface water, portions of the South Percolation Pond are inaccessible with the sonic-rotary and/or direct-push drilling rigs; therefore, proposed soil borings CFSB-113 and CFSB-115 will be advanced using hand tools.

3. Modification #8 (August 30, 2016) – Several surface water and sediment sample locations along the Flathead River are inaccessible by foot due to the presence of forested areas and limited bank/shoreline for traversing; therefore, these sample locations will be accessed with the use of a boat.

In August 2016, USEPA provided approval of Modifications #1 through #7 via email correspondences dated August 23, 2016. Approval of Modification #8 is pending and will be discussed with EPA prior to implementation in September 2016.

2.7 Weekly Reporting and Project Conference Calls

Roux Associates submitted a weekly report to the USEPA for each week in August 2016. The weekly reports include a summary of work completed for the prior week, work upcoming for the next week, health and safety, and any additional notable items.

Conference calls were also held with the project team on August 4 and August 18, 2016. Representatives from USEPA, MDEQ, CFAC, Roux Associates, and CDM Smith were present for the calls. During the call, topics discussed included work progress, schedule and field modifications.

3.0 WORK PLANNED FOR NEXT REPORTING PERIOD

This section summarizes the work planned for September 2016.

3.1 Phase I Site Characterization Drilling and Soil Sampling Scope of Work

Drilling of soil borings, installation of monitoring wells, and soil sampling activities associated with the drilling scope of work are complete as of August 31, 2016. Cascade Drilling will demobilize equipment and supplies from the Site during September 2016.

3.2 Surface Water and Sediment Sampling

Surface water and sediment sampling will commence in September 2016. Samples will be collected in accordance with the RI/FS Work Plan, SAP, SAP Addendum, and any applicable SAP Modifications. Results of the surface water and sediment sampling will be presented in the Phase I Summary Report.

3.3 Groundwater Sampling

Groundwater sampling will commence in September 2016. Hydrometrics personnel will support Roux Associates in the groundwater sampling efforts. Groundwater samples will be collected from all new monitoring well locations (44 new wells) and 20 existing wells. Samples will be collected in accordance with the RI/FS Work Plan, SAP, SAP Addendum, and any applicable SAP Modifications.

3.4 Investigation Derived Waste Disposal

Sample results from the remaining soil IDW containers will be provided to the USEPA for review in September 2016. Based on the sample results, Roux Associates, with the support of Cascade Drilling, will coordinate soil disposal in accordance with the IDW Management Plan.

Water IDW will be sampled at the completion of groundwater sampling activities. Sample results will be provided to the USEPA for review in late September / early October. Based on the sample results, Roux Associates, with the support of Cascade Drilling, will coordinate water disposal in accordance with the IDW Management Plan.

4.0 DATABASE UPDATES

Validation of laboratory data from the Phase I Site Characterization is being performed by Laboratory Data Consultants (LDC) as a subcontractor to Roux Associates. In August 2016, LDC provided thirteen (13) sets of validated soil analytical data to Roux Associates. All sets of data were uploaded to the CFAC RI/FS database in August 2016 by Roux Associates. Validated laboratory data will continue to be imported into the project database and managed in accordance with the data management procedures outlined in Section 7.10 of the QAPP. Future progress reports will discuss updates to the project database.

5.0 SCOPE/SCHEDULE REVISIONS

The schedule was updated to reflect the progress as a result of the activities completed in August 2016. No changes to the overall schedule are expected at this time. The current Phase I Site Characterization schedule is attached to this Progress Report.

On behalf of CFAC, Roux Associates will continue to pursue the overall objectives described in the AOC and the RI/FS Work Plan. Roux Associates will continue to inform the USEPA of completed and upcoming activities pursuant to the requirements of the AOC in future progress reports.

Respectfully submitted,

ROUX ASSOCIATES, INC.

Michael Ritorto
Principal Hydrogeologist /
RI Project Manager

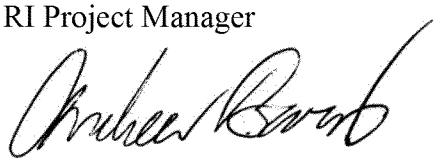

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Table 1. Phase I Site Characterization New Monitoring Wells
Remedial Investigation / Feasibility Study, Columbia Falls Aluminum Company, Columbia Falls, Montana

Well Type	Date Started	Date Completed	Boring Depth (ft)	Well Depth (ft)	Well Screen Top (ft-bls)	Well Screen Bottom (ft-bls)
Water Table	6/13/2016	6/14/2016	80	80	70	80
Water Table	6/2/2016	6/2/2016	54	54	44	54
Deep	5/31/2016	6/3/2016	245.5	200	190	200
Deep	6/13/2016	6/17/2016	300	98	88	98
Water Table	5/18/2016	5/20/2016	86	86	76	86
Water Table	6/28/2016	6/29/2016	50	50	40	50
Deep	6/25/2016	6/29/2016	300	166	156	166
Deep	5/20/2016	5/24/2016	254	210	200	210
Water Table	6/23/2016	6/25/2016	95	95	85	95
Deep	6/21/2016	6/24/2016	300	126	121	126
Water Table	5/19/2016	5/28/2016	125	122	112	122
Deep	5/25/2016	5/27/2016	300	220	210	220
Water Table	6/2/2016	6/3/2016	85	80	70	80
Deep	6/17/2016	6/21/2016	196	N/A	N/A	N/A
Deep	7/13/2016	7/15/2016	300	95	85	95
Water Table	6/14/2016	6/15/2016	50	45	35	45
Water Table	6/30/2016	7/1/2016	45	45	35	45
Water Table	7/11/2016	7/11/2016	60	60	50	60
Deep	6/30/2016	7/12/2016	300	120	110	120
Water Table	5/18/2016	5/19/2016	76	76	66	76
Water Table	8/11/2016	8/12/2016	55	55	45	55
Deep	8/8/2016	8/11/2016	300	205	195	205
Water Table	7/1/2016	7/2/2016	60	60	50	60
Water Table	5/31/2016	6/1/2016	60	60	50	60
Water Table	6/1/2016	6/2/2016	70	70	60	70
Water Table	6/24/2016	6/25/2016	100	100	90	100
Water Table	6/25/2016	6/27/2016	105	105	95	105
Water Table	6/28/2016	6/29/2016	90	90	80	90
Water Table	6/16/2016	6/18/2016	60	60	50	60
Water Table	6/15/2016	6/16/2016	60	60	50	60
Deep	7/20/2016	7/22/2016	300	110	100	110
Water Table	8/15/2016	8/16/2016	96	96	86	96
Deep	8/12/2016	8/16/2016	300	160	150	160
Water Table	6/21/2016	6/22/2016	120	120	110	120
Deep	8/20/2016	8/25/2016	300	148.5	138.5	148.5
Water Table	6/22/2016	6/24/2016	120	120	110	120
Deep	8/17/2016	8/20/2016	300	160	150	160
Water Table	6/20/2016	6/21/2016	85	85	75	85
Deep	7/15/2016	7/19/2016	294	135	125	135
Water Table	7/19/2016	7/19/2016	50	50	40	50
Deep	7/27/2016	7/30/2016	300	138	128	138
Water Table	7/26/2016	7/27/2016	90	90	80	90
Deep	7/22/2016	7/26/2016	300	168	158	168
Water Table	7/12/2016	7/13/2016	25	23	13	23
Water Table	7/11/2016	7/11/2016	30	30	20	30

Note

1. Monitoring well CFMW-023a was not installed as indicated in Field Modification #2

Table 2. Soil Samples Collected Through August 2016
CFAC Phase I Site Characterization, Columbia Falls Aluminum Company, Montana

Location ID	Date Sampled	Surface (0-0.5 ft bls)	Shallow (0.5-2 ft bls)	Vadose (10-12 ft bls)	Below Water Table	Surface (0-0.5 ft bls) Lead Only	Notes
CFMW-010	5/18/2016	X	X	X		X	
CFMW-029	5/18/2016	X	X	X			
CFSB-120	5/18/2016	X	X	X			
CFSB-121	5/18/2016	X	X	X			
CFSB-125	5/18/2016	X	X	X			
CFSB-126	5/18/2016	X	X	X			
CFSB-127	5/18/2016	X	X	X			
CFMW-018	5/19/2016	X	X	X			
CFSB-011	5/19/2016	X	X	X			
CFSB-013	5/19/2016	X	X	X			
CFSB-122	5/19/2016	X	X	X			
CFSB-123	5/19/2016	X	X	X			
CFSB-124	5/19/2016	X	X	X			
CFMW-012a	5/20/2016	X	X	X	X	X	
CFSB-040	5/20/2016	X	X	X			
CFSB-042	5/20/2016	X	X	X			
CFSB-044	5/20/2016	X	X	X			
CFSB-046	5/20/2016	X	X	X			
CFSB-048	5/20/2016	X	X	X			
CFSB-052	5/20/2016		X	X			No surface sample collected -concrete surface from 0-0.5 ft bls
CFSB-010	5/21/2016		X	X			No surface sample collected -asphalt surface from 0-0.5 ft bls
CFSB-038	5/21/2016	X	X	X			
CFSB-045	5/21/2016	X	X	X			
CFSB-050	5/21/2016	X	X	X			
CFSB-051	5/21/2016	X	X	X			
CFSB-006	5/23/2016	X	X	X			
CFSB-008	5/23/2016	X	X	X			
CFSB-009	5/23/2016	X	X	X			
CFSB-021	5/23/2016	X	X	X			
CFSB-022	5/23/2016	X	X	X			
CFSB-029	5/23/2016	X	X	X			
CFSB-033	5/23/2016	X	X	X			
CFSB-094	5/24/2016	X	X	X			
CFSB-095	5/24/2016	X	X	X			
CFSB-097	5/24/2016	X	X	X			
CFSB-098	5/24/2016	X	X	X			
CFSB-099	5/24/2016	X	X	X			
CFSB-100	5/24/2016	X	X	X			
CFSB-128	5/24/2016	X	X	X			
CFSB-129	5/24/2016	X	X	X			
CFMW-019a	5/25/2016	X	X	X			Below water table sample not collected due to no recovery in sample interval
CFSB-001	5/25/2016	X	X	X			
CFSB-002	5/25/2016	X	X	X			

Table 2. Soil Samples Collected Through August 2016
CFAC Phase I Site Characterization, Columbia Falls Aluminum Company, Montana

Location ID	Date Sampled	Surface (0-0.5 ft bls)	Shallow (0.5-2 ft bls)	Vadose (10-12 ft bls)	Below Water Table	Surface (0-0.5 ft bls) Lead Only	Notes
CFSB-003	5/25/2016	X	X	X			
CFSB-004	5/25/2016	X	X	X			
CFSB-005	5/25/2016	X	X	X			
CFSB-007	5/25/2016	X	X	X			
CFSB-086	5/26/2016	X	X	X			
CFSB-087	5/26/2016	X	X	X			
CFSB-088	5/26/2016	X	X	X			
CFSB-092	5/26/2016	X	X	X			
CFSB-060	5/27/2016	X	X	X			
CFSB-066	5/27/2016	X	X	X			
CFSB-068	5/27/2016		X	X			No surface sample collected -asphalt surface from 0-0.5 ft bls
CFSB-071	5/27/2016	X	X	X			
CFSB-084	5/27/2016	X	X	X			
CFSB-012	5/28/2016		X	X			No surface sample collected -asphalt surface from 0-0.5 ft bls
CFSB-049	5/28/2016		X	X			No surface sample collected -asphalt surface from 0-0.5 ft bls
CFSB-054	5/28/2016	X	X	X			
CFSB-055	5/28/2016	X	X	X			
CFSB-057	5/28/2016	X	X	X			
CFSB-059	5/28/2016	X	X	X			
CFMW-003a	5/31/2016	X	X	X			
CFMW-034	5/31/2016	X	X	X			
CFSB-034	5/31/2016	X	X	X			
CFSB-035	5/31/2016	X	X	X			
CFSB-036	5/31/2016	X	X	X			
CFSB-037	5/31/2016	X	X	X			
CFSB-053	5/31/2016		X	X			No surface sample collected -asphalt surface from 0-0.5 ft bls
CFMW-035	6/1/2016	X	X	X			
CFSB-073	6/1/2016	X	X	X			
CFSB-074	6/1/2016	X	X	X			
CFSB-075	6/1/2016	X	X	X			
CFSB-079	6/1/2016	X	X	X			
CFSB-080	6/1/2016	X	X	X			
CFSB-082	6/1/2016	X	X	X			
CFMW-003a	6/2/2016				X		Below Water Table collected 23-28 ft bls
CFMW-022	6/2/2016	X	X	X		X	
CFSB-014	6/2/2016	X	X	X			
CFSB-016	6/2/2016	X	X	X			
CFSB-062	6/2/2016	X	X	X			
CFSB-065	6/2/2016	X	X	X			
CFSB-064	6/3/2016	X	X	X			
CFSB-132	6/3/2016	X	X	X			
CFSB-133	6/3/2016	X	X	X			
CFSB-019	6/4/2016	X	X				
CFMW-002	6/13/2016	X	X	X			
CFMW-008a	6/13/2016	X	X	X	X	X	Below Water Table collected 88-93 ft bls
CFSB-019	6/13/2016			X			

Table 2. Soil Samples Collected Through August 2016
CFAC Phase I Site Characterization, Columbia Falls Aluminum Company, Montana

Location ID	Date Sampled	Surface (0-0.5 ft bls)	Shallow (0.5-2 ft bls)	Vadose (10-12 ft bls)	Below Water Table	Surface (0-0.5 ft bls) Lead Only	Notes
CFSB-025	6/13/2016	X	X	X			
CFSB-026	6/13/2016	X	X	X			
CFSB-027	6/13/2016	X	X	X			
CFSB-030	6/13/2016	X	X	X			
CFISS-001	6/14/2016	X	X				
CFISS-002	6/14/2016	X	X				
CFMW-008a	6/14/2016						
CFMW-026	6/14/2016	X	X	X		X	
CFISS-003	6/15/2016	X	X				
CFISS-004	6/15/2016	X	X			X	
CFMW-043	6/15/2016	X	X	X			
CFISS-005	6/16/2016	X	X			X	
CFMW-042	6/16/2016	X	X	X			
CFISS-006	6/17/2016	X	X				
CFISS-007	6/17/2016	X	X				
CFMW-023a	6/17/2016	X	X	X		X	
CFSB-130	6/17/2016		X	X			Inside Main Plant. No surface sample collected - concrete from 0-0.5
CFSB-131	6/17/2016		X	X			Inside Main Plant. No surface sample collected - concrete from 0-0.5. Two additional samples collected as oppurtunity samples due to visual contamination. 18-20 ft bls as most impacted interval. 22-23 ft bls as below impacts.
CFISS-008	6/18/2016	X	X				
CFISS-015	6/18/2016	X	X				
CFMW-023a	6/18/2016				X		Below Water Table collected 123-128 ft bls
CFISS-013	6/20/2016	X	X			X	
CFISS-014	6/20/2016	X	X				
CFMW-054	6/20/2016	X	X	X			
CFISS-011	6/21/2016	X	X			X	
CFISS-012	6/21/2016	X	X				
CFMW-016a	6/21/2016	X	X	X	X	X	Below Water Table collected 79-84 ft bls
CFMW-047	6/21/2016					X	
CFMW-047	6/21/2016	X	X	X			
CFISS-009	6/22/2016	X	X				
CFISS-010	6/22/2016	X	X				
CFMW-050	6/22/2016	X	X	X		X	
CFISS-016	6/23/2016	X	X				
CFISS-017	6/23/2016	X	X				
CFISS-018	6/24/2016	X	X				
CFISS-019	6/24/2016	X	X				
CFMW-037	6/24/2016	X	X	X		X	
CFISS-020	6/25/2016	X	X				
CFISS-021	6/25/2016	X	X			X	
CFMW-038	6/25/2016	X	X	X		X	
CFMW-038	6/25/2016						
CFMW-11a	6/25/2016	X	X	X	X	X	Below Water Table collected 31-36 ft bls
CFISS-022	6/27/2016	X	X				
CFISS-023	6/27/2016	X	X				
CFISS-029	6/27/2016	X	X				
CFISS-016	6/28/2016		X				
CFMW-040	6/28/2016	X	X	X		X	
CFMW-040	6/28/2016						
CFISS-024	6/29/2016	X	X				

Table 2. Soil Samples Collected Through August 2016
CFAC Phase I Site Characterization, Columbia Falls Aluminum Company, Montana

Location ID	Date Sampled	Surface (0-0.5 ft bls)	Shallow (0.5-2 ft bls)	Vadose (10-12 ft bls)	Below Water Table	Surface (0-0.5 ft bls) Lead Only	Notes
CFISS-025	6/30/2016	X	X				
CFISS-026	6/30/2016	X	X				
CFMW-027	6/30/2016	X	X	X		X	
CFMW-028a	6/30/2016	X	X	X	X	X	Below Water Table collected 48-53 ft bls. One additional sample collected from CMFW-28a from a zone of potential impact at 4.5-6' bls
CFISS-027	7/1/2016	X	X				
CFISS-028	7/1/2016	X	X			X	
CFMW-033	7/1/2016	X	X	X		X	
CFISS-034	7/11/2016	X	X				
CFISS-035	7/11/2016	X	X				
CFMW-064	7/11/2016	X	X	X		X	
CFISS-032	7/12/2016	X	X			X	
CFISS-033	7/12/2016	X	X				
CFMW-061	7/12/2016	X	X	X		X	
CFSB-114	7/12/2016	X	X	X			
CFSB-119	7/12/2016	X	X	X			
CFISS-031	7/13/2016	X	X				
CFISS-040	7/13/2016	X	X			X	
CFMW-025a	7/13/2016	X	X	X	X	X	Below water table collected from 35-40 ft bls
CFSB-102	7/13/2016	X	X	X			
CFSB-104	7/13/2016	X	X	X			
CFSB-109	7/13/2016	X	X	X			
CFSB-110	7/13/2016	X	X	X			
CFISS-038	7/14/2016	X	X				
CFISS-039	7/14/2016	X	X				
CFISS-036	7/15/2016	X	X				
CFISS-037	7/15/2016	X	X			X	
CFMW-056a	7/15/2016	X	X	X	X	X	Below water table collected from 37-42 ft bls
CFISS-041	7/16/2016	X	X				
CFISS-042	7/18/2016	X	X				
CFISS-043	7/18/2016	X	X				
CFSB-028	7/18/2016	X	X	X			
CFISS-002	7/19/2016	X	X				
CFISS-030	7/20/2016	X	X				
CFMW-044a	7/20/2016	X	X	X	X	X	Below water table collected from 49-54 ft bls
CFSB-101	7/21/2016	X	X	X			
CFSB-118	7/21/2016	X	X	X			
CFMW-059a	7/22/2016	X	X	X	X	X	Below water table collected from 79-84 ft bls
CFSB-116	7/22/2016	X	X	X			
CFISS-006	7/25/2016	X	X				
CFISS-008	7/26/2016	X	X				
CFMW-057a	7/27/2016	X	X	X	X		Below water table collected from 30-35 ft bls
CFMW-032a	8/8/2016	X	X	X	X	X	Below water table collected from 43-48 ft bls
CFMW-045a	8/12/2016	X	X	X	X		Below water table collected from 86-91 ft bls
CFMW-053a	8/17/2016	X	X	X	X	X	Below water table collected from 59-64 ft bls
CFMW-049a	8/20/2016	X	X	X	X	X	Below water table from 112-117 ft bls
CFTP-19	8/25/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFTP-20	8/25/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFTP-21	8/25/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFTP-22	8/25/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFTP-17	8/25/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6

Table 2. Soil Samples Collected Through August 2016
CFAC Phase I Site Characterization, Columbia Falls Aluminum Company, Montana

Location ID	Date Sampled	Surface (0-0.5 ft bls)	Shallow (0.5-2 ft bls)	Vadose (10-12 ft bls)	Below Water Table	Surface (0-0.5 ft bls) Lead Only	Notes
CFTP-23	8/26/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFTP-18	8/26/2016	X	X	X			Shallow sample collected from 2-4 ft bls in accordance with modification #6
CFSB-113	8/31/2016	X	X	X		X	Vadose sample collected from 2-4 ft bls using hand tools in accordance with modification #7
CFSB-115	8/31/2016	X	X	X			Vadose sample collected from 2-4 ft bls using hand tools in accordance with modification #7

Table 3. Monitoring Well Survey Data
Remedial Investigation/Feasibility Study, Columbia Falls Aluminum Company, Montana

Well Location ID	Previous Well ID	Date Surveyed	Surveyor	Northing (Y) (NAD83 MT State Plane)	Easting (X) (NAD83 MT State Plane)	Top of Casing (ft-amsl)	Well Pad/ Ground (ft-amsl)
CFMW-001	W2-CFMW1	8/1/2016	Sands	1549228.859	842170.366	3173.783	3170.907
CFMW-002	--	7/6/2016	Sands	1546021.158	843027.354	3145.580	3142.750
CFMW-003	--	7/6/2016	Sands	1547594.617	841640.301	3144.950	3142.320
CFMW-003a	--	7/6/2016	Sands	1547603.170	841647.493	3145.570	3143.010
CFMW-007	TW3	8/1/2016	Sands	1546426.597	843029.760	3149.199	3147.958
CFMW-008	TW9	7/6/2016	Sands	1546564.756	844032.614	3192.970	3191.769
CFMW-008a	--	7/6/2016	Sands	1546575.278	844043.577	3196.440	3194.690
CFMW-010	--	7/6/2016	Sands	1546115.479	842986.314	3147.060	3144.690
CFMW-011	--	7/6/2016	Sands	1545989.982	842462.741	3103.410	3100.980
CFMW-011a	--	7/6/2016	Sands	1545990.300	842455.026	3103.650	3100.770
CFMW-012	W11-TW17	7/6/2016	Sands	1545999.738	843116.466	3142.480	3140.472
CFMW-012a	--	7/6/2016	Sands	1545978.652	843111.473	3142.760	3140.290
CFMW-014	W3-TW20	8/1/2016	Sands	1545822.378	842858.322	3142.310	3139.968
CFMW-015	W4-TW21	8/1/2016	Sands	1545790.290	843070.037	3140.650	3138.933
CFMW-016	--	7/6/2016	Sands	1545847.943	843955.534	3166.590	3163.840
CFMW-016a	--	7/6/2016	Sands	1545856.544	843955.402	3167.110	3164.290
CFMW-017	TW14	8/1/2016	Sands	1545913.137	844140.867	3210.569	3207.893
CFMW-018	--	7/6/2016	Sands	1545750.745	844586.938	3212.810	3210.040
CFMW-019	W5-TW15	8/1/2016	Sands	1545555.121	843277.960	3137.810	3136.232
CFMW-019a	--	7/6/2016	Sands	1545565.436	843291.647	3138.980	3136.510
CFMW-020	TW8	8/1/2016	Sands	1545748.365	844071.614	3168.737	3166.624
CFMW-021	W6-TW18	8/1/2016	Sands	1545558.392	843505.246	3138.155	3136.090
CFMW-022	--	7/6/2016	Sands	1545314.578	843942.176	3137.320	3134.390
CFMW-023	TW10	8/1/2016	Sands	1545521.210	844694.956	3209.982	3208.638
CFMW-025	TW23	8/1/2016	Sands	1545240.341	840912.165	3103.541	3101.160
CFMW-025a	--	8/1/2016	Sands	1545217.964	840914.892	3104.198	3101.489
CFMW-025b	W10-TW22	7/6/2016	Sands	1545233.747	840916.756	3103.660	3101.599
CFMW-026	--	7/6/2016	Sands	1545199.463	841222.779	3104.260	3101.580
CFMW-027	--	7/6/2016	Sands	1545251.431	842166.064	3097.110	3094.380
CFMW-028	--	8/1/2016	Sands	1544970.966	843041.414	3108.699	3105.991
CFMW-028a	--	8/1/2016	Sands	1544970.077	843049.717	3108.660	3105.916
CFMW-029	--	7/6/2016	Sands	1545108.045	843463.411	3133.040	3130.520
CFMW-031	W0-CFMW2	8/1/2016	Sands	1544867.601	842797.671	3109.490	3107.820

Table 3. Monitoring Well Survey Data
Remedial Investigation/Feasibility Study, Columbia Falls Aluminum Company, Montana

Well Location ID	Previous Well ID	Date Surveyed	Surveyor	Northing (Y) (NAD83 MT State Plane)	Easting (X) (NAD83 MT State Plane)	Top of Casing (ft-amsl)	Well Pad/ Ground (ft-amsl)
CFMW-032	--	8/29/2016	Sands	1544745.320	843964.007	3116.578	3114.020
CFMW-032a	--	8/29/2016	Sands	1544744.536	843973.334	3116.805	3114.095
CFMW-033	--	7/6/2016	Sands	1544545.111	842408.017	3110.640	3107.970
CFMW-034	--	7/6/2016	Sands	1544513.493	843342.204	3109.990	3107.450
CFMW-035	--	7/6/2016	Sands	1544499.012	844447.319	3109.920	3107.120
CFMW-037	--	7/6/2016	Sands	1543140.324	844473.946	3113.640	3110.870
CFMW-038	--	7/6/2016	Sands	1543075.138	843981.359	3113.770	3110.880
CFMW-040	--	7/6/2016	Sands	1543076.822	842863.264	3113.720	3111.050
CFMW-042	--	7/6/2016	Sands	1543285.825	842383.655	3110.340	3107.520
CFMW-043	--	7/6/2016	Sands	1544078.364	842157.850	3109.910	3106.970
CFMW-044	W8-TW2	8/1/2016	Sands	1543941.726	841700.388	3108.093	3105.883
CFMW-044a	--	8/1/2016	Sands	1543941.659	841685.038	3108.716	3106.109
CFMW-044b	TW1	8/1/2016	Sands	1543937.612	841699.554	3107.979	3105.262
CFMW-045	--	8/29/2016	Sands	1542768.892	842543.665	3113.750	3111.261
CFMW-045a	--	8/29/2016	Sands	1542768.562	842554.018	3113.934	3111.284
CFMW-047	--	7/6/2016	Sands	1542470.126	844332.708	3117.180	3114.480
CFMW-049	W7-TW19	8/1/2016	Sands	1542470.637	844793.481	3122.693	3120.165
CFMW-049a	--	8/29/2016	Sands	1542484.164	844793.737	3122.691	3120.493
CFMW-050	--	7/6/2016	Sands	1542299.178	844928.802	3123.120	3120.240
CFMW-053	TW16	8/1/2016	Sands	1542974.491	841601.392	3111.227	3109.649
CFMW-053a	--	8/29/2016	Sands	1542988.456	841600.660	3112.061	3109.666
CFMW-054	--	7/6/2016	Sands	1542966.021	841003.141	3112.670	3109.920
CFMW-056	TW11	8/1/2016	Sands	1544572.964	839789.319	3101.349	3098.851
CFMW-056a	--	8/1/2016	Sands	1544587.443	839786.440	3101.079	3098.671
CFMW-056b	--	8/1/2016	Sands	1544590.852	839778.849	3101.199	3098.599
CFMW-057	TW12	8/1/2016	Sands	1543626.421	837706.038	3094.937	3092.563
CFMW-057a	--	8/29/2016	Sands	1543635.868	837689.701	3094.774	3092.778
CFMW-059	--	8/1/2016	Sands	1542120.760	837611.730	3119.421	3117.387
CFMW-059a	--	8/1/2016	Sands	1542123.943	837619.424	3119.178	3117.047
CFMW-061	--	8/1/2016	Sands	1541698.045	843728.230	3027.378	3024.323
CFMW-064	--	8/29/2016	Sands	1541612.776	844718.875	3029.141	3026.002

Table 4. Groundwater Elevation Data Collected August 30, 2016
Phase I Site Characterization, Columbia Falls Aluminum Company RI/FS, Columbia Falls, Montana

Well Type	Well Location ID	Previous Well ID	Top of Casing (ft-amsl)	August 30, 2016 DTW (ft-btoc)	August 30, 2016 DTB (ft-btoc)	August 30, 2016 Groundwater Elevation (ft-amsl)
Existing Monitoring Well	CFMW-001	W2-CFMW1	3173.783	98.53	155.2	3075.253
Water Table Monitoring Well	CFMW-002	--	3145.58	80.3	82.65	3065.28
Water Table Monitoring Well	CFMW-003	--	3144.95	23.47	54.42	3121.48
Deep Monitoring Well	CFMW-003a	--	3145.57	151.4	203.21	2994.17
Existing Monitoring Well	CFMW-007	TW3	3149.199	81.35	159.7	3067.849
Existing Monitoring Well	CFMW-008	TW9	3192.97	93.6	189.21	3099.37
Deep Monitoring Well	CFMW-008a	--	3196.44	65.03	95.14	3131.41
Water Table Monitoring Well	CFMW-010	--	3147.06	81.68	86.7	3065.38
Water Table Monitoring Well	CFMW-011	--	3103.41	38.42	52.9	3064.99
Deep Monitoring Well	CFMW-011a	--	3103.65	100.55	171.12	3003.1
Existing Monitoring Well	CFMW-012	W11-TW17	3142.48	75.7	81.84	3066.78
Deep Monitoring Well	CFMW-012a	--	3142.76	145.34	213.4	2997.42
Existing Monitoring Well	CFMW-014	W3-TW20	3142.31	77.43	93.43	3064.88
Existing Monitoring Well	CFMW-015	W4-TW21	3140.65	75.57	94.56	3065.08
Water Table Monitoring Well	CFMW-016	--	3166.59	97.7	98.82	3068.89
Deep Monitoring Well	CFMW-016a	--	3167.11	100.33	128.36	3066.78
Existing Monitoring Well	CFMW-017	TW14	3210.569	DRY	140.88	DRY
Water Table Monitoring Well	CFMW-018	--	3212.81	DRY	126.74	DRY
Existing Monitoring Well	CFMW-019	W5-TW15	3137.81	73.38	96.5	3064.43
Deep Monitoring Well	CFMW-019a	--	3138.98	141.5	223.2	2997.48
Existing Monitoring Well	CFMW-020	TW8	3168.737	102.05	132.63	3066.687
Existing Monitoring Well	CFMW-021	W6-TW18	3138.155	73.72	89.56	3064.435
Water Table Monitoring Well	CFMW-022	--	3137.32	72.58	83.26	3064.74
Existing Monitoring Well	CFMW-023	TW10	3209.982	125.4	142.96	3084.582
Existing Monitoring Well	CFMW-025	TW23	3103.541	DRY	26.8	DRY
Deep Monitoring Well	CFMW-025a	--	3104.198	48.55	98.42	3055.648
Existing Monitoring Well	CFMW-025b	W10-TW22	3103.66	34.82	64.85	3068.84
Water Table Monitoring Well	CFMW-026	--	3104.26	40.2	47.44	3064.06
Water Table Monitoring Well	CFMW-027	--	3097.11	32.86	48.6	3064.25
Water Table Monitoring Well	CFMW-028	--	3108.699	44.46	62.4	3064.239
Deep Monitoring Well	CFMW-028a	--	3108.66	44.31	122.62	3064.35
Water Table Monitoring Well	CFMW-029	--	3133.04	68.6	73.12	3064.44
Existing Monitoring Well	CFMW-031	W0-CFMW2	3109.49	45.61	52.3	3063.88
Water Table Monitoring Well	CFMW-032	--	3116.578	51.99	57.7	3064.588
Deep Monitoring Well	CFMW-032a	--	3116.805	113.22	206.53	3003.585
Water Table Monitoring Well	CFMW-033	--	3110.64	46.88	63.59	3063.76
Water Table Monitoring Well	CFMW-034	--	3109.99	48.23	62.48	3061.76
Water Table Monitoring Well	CFMW-035	--	3109.92	46.56	70.6	3063.36
Existing Monitoring Well	CFMW-036	W1-PW7	3021.6	NM	NM	NM
Water Table Monitoring Well	CFMW-037	--	3113.64	78.48	103.27	3035.16
Water Table Monitoring Well	CFMW-038	--	3113.77	86.82	107.14	3026.95
Water Table Monitoring Well	CFMW-040	--	3113.72	77.17	92.77	3036.55
Water Table Monitoring Well	CFMW-042	--	3110.34	57.94	63.02	3052.4
Water Table Monitoring Well	CFMW-043	--	3109.91	47.99	62.01	3061.92
Existing Monitoring Well	CFMW-044	W8-TW2	3108.093	48.07	54.16	3060.023
Deep Monitoring Well	CFMW-044a	--	3108.716	52.32	112.97	3056.396
Existing Monitoring Well	CFMW-044b	TW1	3107.979	63.95	241.01	3044.029
Water Table Monitoring Well	CFMW-045	--	3113.75	83.78	100.08	3029.97
Deep Monitoring Well	CFMW-045a	--	3113.934	89.56	161.28	3024.374
Water Table Monitoring Well	CFMW-047	--	3117.18	99.75	122.93	3017.43
Existing Monitoring Well	CFMW-048	PW3	3106.85	NM	NM	NM
Existing Monitoring Well	CFMW-049	W7-TW19	3122.693	104.9	141.01	3017.793
Deep Monitoring Well	CFMW-049a	--	3122.691	105	151.1	3017.691
Water Table Monitoring Well	CFMW-050	--	3123.12	105.78	123.37	3017.34
Existing Monitoring Well	CFMW-051	W9-PW5	3123.25	NM	NM	NM
Existing Monitoring Well	CFMW-052	PW4	3139.47	NM	NM	NM
Existing Monitoring Well	CFMW-053	TW16	3111.227	58.78	76.24	3052.447
Deep Monitoring Well	CFMW-053a	--	3112.061	88.3	162.5	3023.761
Water Table Monitoring Well	CFMW-054	--	3112.67	73.77	87.55	3038.9
Existing Monitoring Well	CFMW-056	TW11	3101.349	86.56	180.58	3014.789
Deep Monitoring Well	CFMW-056a	--	3101.079	79.96	137.4	3021.119
Water Table Monitoring Well	CFMW-056b	--	3101.199	33.7	52.65	3067.499
Existing Monitoring Well	CFMW-057	TW12	3094.937	83.81	184.4	3011.127
Deep Monitoring Well	CFMW-057a	--	3094.774	78.55	140.35	3016.224
Water Table Monitoring Well	CFMW-059	--	3119.421	70.42	92.7	3049.001
Deep Monitoring Well	CFMW-059a	--	3119.178	73.05	162.98	3046.128
Water Table Monitoring Well	CFMW-061	--	3027.378	13.82	26.04	3013.558
Existing Monitoring Well	CFMW-062	PW6	3021.6	NM	NM	NM
Water Table Monitoring Well	CFMW-064	--	3029.141	14.4	33.08	3014.741

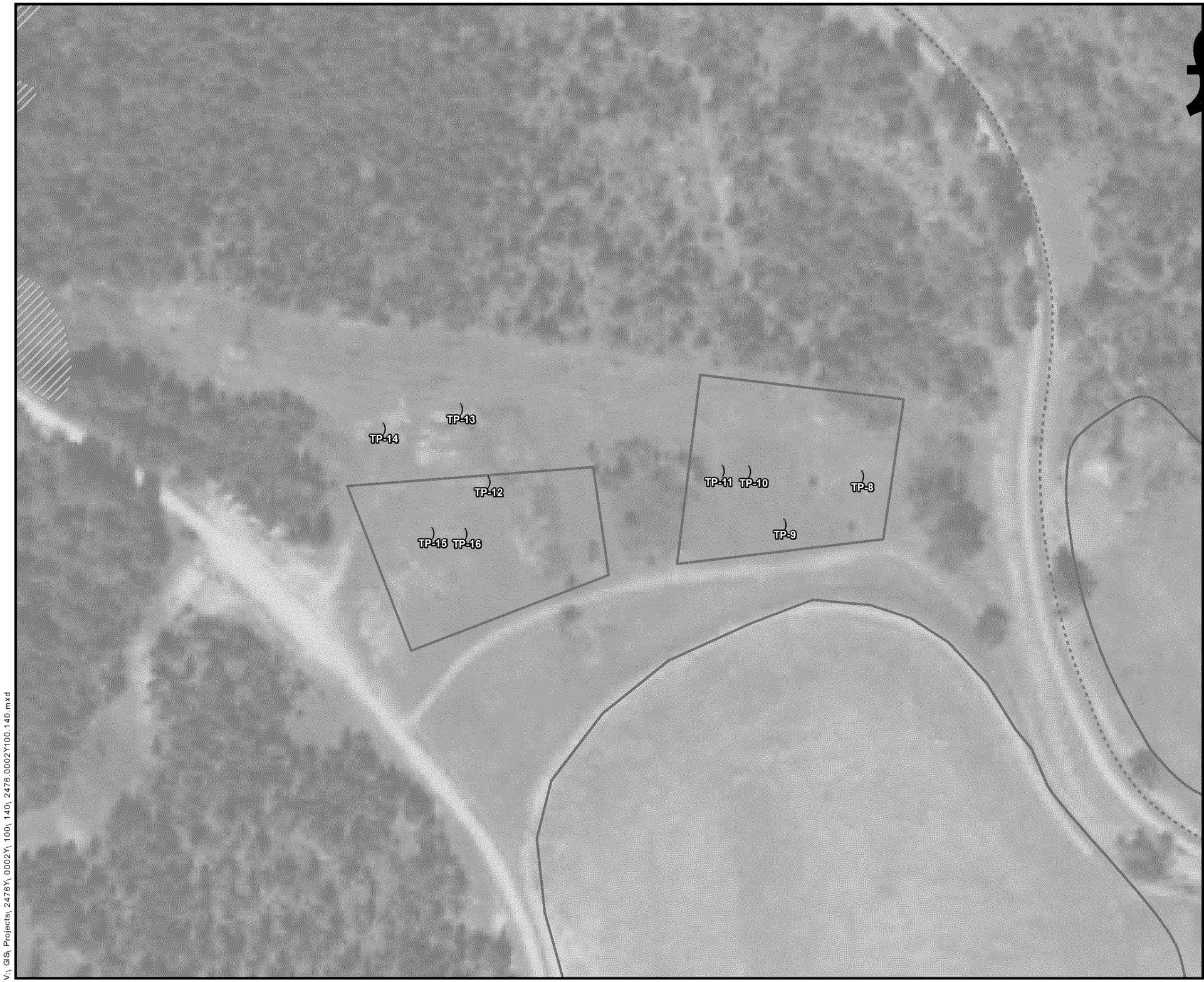
Notes
NM - Not measured/Not accessible

Table 5. Asbestos Landfill Observations
Phase I Site Characterization, CFAC RI/FS, Columbia Falls, Montana

Test Pit ID	Location	Observations
Test Pit #1	Southwest Asbestos Landfill	No asbestos observed
Test Pit #2	Southwest Asbestos Landfill	No asbestos observed
Test Pit #3	Southwest Asbestos Landfill	No asbestos observed
Test Pit #4	Southeast Asbestos Landfill	No asbestos observed
Test Pit #5	Southeast Asbestos Landfill	No asbestos observed
Test Pit #6	Southeast Asbestos Landfill	No asbestos observed
Test Pit #7	Southeast Asbestos Landfill	Asbestos pipe and bags observed
Test Pit #8	Northeast Asbestos Landfill	Metal grates and concrete observed; No asbestos observed
Test Pit #9	Northeast Asbestos Landfill	No asbestos observed
Test Pit #10	Northeast Asbestos Landfill	No asbestos observed
Test Pit #11	Northeast Asbestos Landfill	No asbestos observed
Test Pit #12	Northwest Asbestos Landfill	Asbestos bags observed
Test Pit #13	Northwest Asbestos Landfill	No asbestos observed
Test Pit #14	Northwest Asbestos Landfill	No asbestos observed
Test Pit #15	Northwest Asbestos Landfill	Asbestos pipe and bags observed
Test Pit #16	Northwest Asbestos Landfill	Asbestos bags observed

FIGURES

1. Northern Asbestos Test Pit Locations
2. Southern Asbestos Test Pit Locations



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Legend

- Asbestos Landfill Test Pit Locations
- Site Features

62.5 0 62.5 125
Feet

Title:

NORTHERN ASBESTOS TEST PIT LOCATIONS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:
COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 09SEP16	FIGURE 1
Prepared by: M.R.	Scale: 1 "= 125 '	
Project Mgr: M.R.	Project: 2476.0001Y002	
File: 2476.0002Y100.140		

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2018-003543-0560

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Legend

- Asbestos Landfill Test Pit Locations
- Site Features

62.5 0 62.5 125
Feet

Title:

SOUTHERN ASBESTOS TEST PIT LOCATIONS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:
COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 09SEP16	FIGURE 2
Prepared by: M.R.	Scale: 1 "= 125 '	
Project Mgr: M.R.	Project: 2476.0001Y002	
File: 2476.0002Y100.141		

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2018-003543-0560

APPENDICES

A. Project Schedule

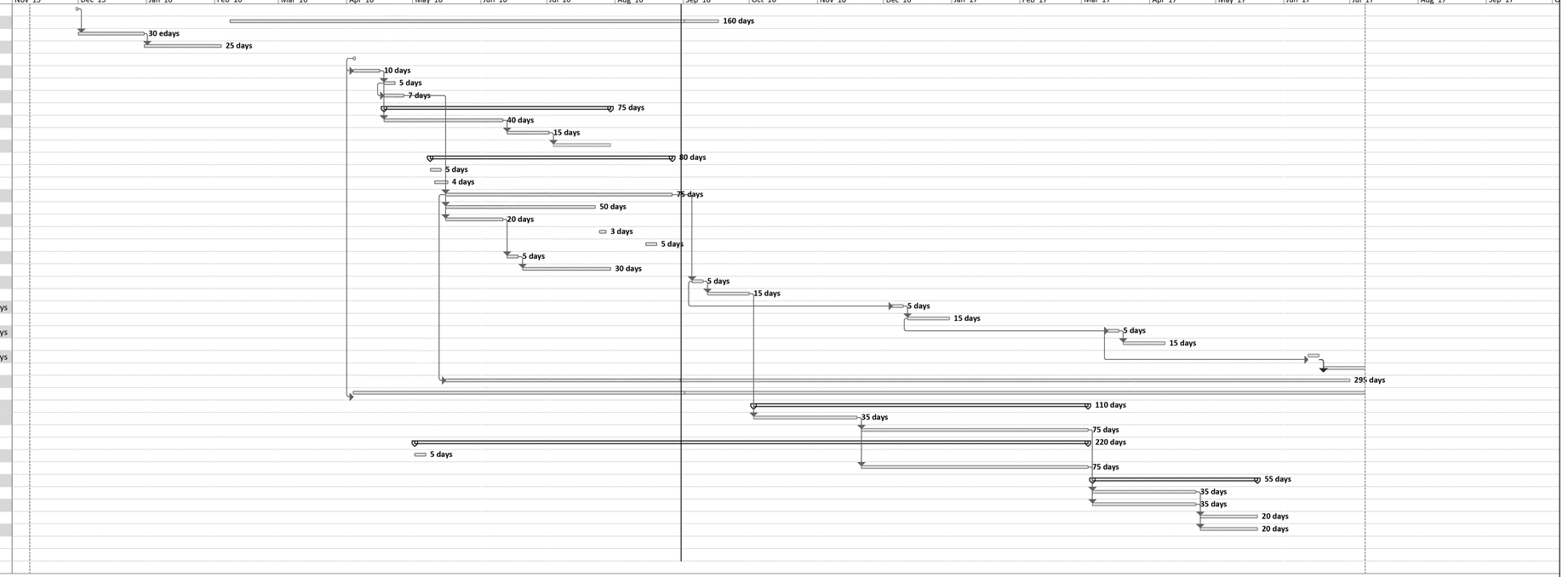
B. Landfill GPR Report

APPENDIX A

Project Schedule

Project Schedule Updated August 31, 2016

ID	Deliverable	Task Name	Duration	Start	Finish	Company	Predecessors
1		AOC is executed by all parties	1 day	Mon 11/30/15	Mon 11/30/15	EPA/CFAC	
2		Historical Records Review	160 days	Mon 2/8/16	Fri 9/16/16	Roux	
3	X	Draft Health and Safety Plan (HASP)	30 edays	Mon 11/30/15	Wed 12/30/15	Roux	1
4	X	Final Health and Safety Plan (HASP)	25 days	Thu 12/31/15	Wed 2/3/16	Roux	3
5		Site is clear of Snow / Field Work Begins	1 day	Mon 4/4/16	Mon 4/4/16		
6		Pre-Intrusive Task 1 - Site Reconnaisance	10 days	Mon 4/4/16	Fri 4/15/16	Roux	5SS
7		Pre-Intrusive Task 2 - Geophysical Survey	5 days	Mon 4/18/16	Fri 4/22/16	Roux	6
8		Pre-Intrusive Task 3 - Soil Gas Survey	7 days	Mon 4/18/16	Tue 4/26/16	Roux	7SS
9		**SAP Addendum**	**75 days**	**Mon 4/18/16**	**Fri 7/29/16**	**Roux**	
10	X	Draft SAP Addendum	40 days	Mon 4/18/16	Fri 6/10/16	Roux	6
11		EPA Review of Draft SAP Addendum	15 days	Mon 6/13/16	Fri 7/1/16	EPA	10
12	X	Final SAP Addendum	20 days	Mon 7/4/16	Fri 7/29/16	Roux	11
13		**Source Area Investigation**	**80 days**	**Mon 5/9/16**	**Fri 8/26/16**	**Roux/Hydrometrics**	
14		GPR Utility Mark-Outs	5 days	Mon 5/9/16	Fri 5/13/16	Roux	
15		Clearing / Grading for Drill Rig Access	4 days	Wed 5/11/16	Mon 5/16/16	Roux	
16		Sonic Rig 1	75 days	Mon 5/16/16	Fri 8/26/16	Roux	8FS+10 days
17		Sonic Rig 2	50 days	Mon 5/16/16	Fri 7/22/16	Roux	8FS+10 days
18		Geoprobe	20 days	Mon 5/16/16	Fri 6/10/16	Hydrometrics	8FS+10 days
19		Landfill GPR Survey Field Work	3 days	Mon 7/25/16	Wed 7/27/16	Roux	
20		Test Pitting	5 days	Mon 8/15/16	Fri 8/19/16	Roux	
21		Background Area Investigation	5 days	Mon 6/13/16	Fri 6/17/16	Hydrometrics	18
22		Operational Grid Area Investigation	30 days	Mon 6/20/16	Fri 7/29/16	Hydrometrics	21
23		Site-Wide Surface Water Sampling - Event 1	5 days	Mon 9/5/16	Fri 9/9/16	Roux/Hydrometrics	16FS+5 days
24		Site-Wide Groundwater Sampling - Event 1	15 days	Mon 9/12/16	Fri 9/30/16	Roux/Hydrometrics	23
25		Site-Wide Surface Water Sampling - Event 2	5 days	Mon 12/5/16	Fri 12/9/16	Roux/Hydrometrics	23SS+90 edays
26		Site-Wide Groundwater Sampling - Event 2	15 days	Mon 12/12/16	Fri 12/30/16	Roux/Hydrometrics	25
27		Site-Wide Surface Water Sampling - Event 3	5 days	Mon 3/13/17	Fri 3/17/17	Roux/Hydrometrics	26SS+90 edays
28		Site-Wide Groundwater Sampling - Event 3	15 days	Mon 3/20/17	Fri 4/7/17	Roux/Hydrometrics	27
29		Site-Wide Surface Water Sampling - Event 4	5 days	Mon 6/12/17	Fri 6/16/17	Roux/Hydrometrics	27SS+90 edays
30		Site-Wide Groundwater Sampling - Event 4	15 days	Mon 6/19/17	Fri 7/7/17	Roux/Hydrometrics	29
31		Background Hydrology Studies	295 days	Mon 5/16/16	Fri 6/30/17	Roux	16SS
32		Investigation Derived Waste Management/Disposal	330 days	Mon 4/4/16	Fri 7/7/17	Roux	5SS
33		**Draft Phase 1 Data Summary Report**	**110 days**	**Mon 10/3/16**	**Fri 3/3/17**	**Roux**	
34		Data Validation Completion	35 days	Mon 10/3/16	Fri 11/18/16	Data Validator	24
35	X	Draft Phase I Site Characterization Summary Report	75 days	Mon 11/21/16	Fri 3/3/17	Roux	34
36		**SLERA**	**220 days**	**Mon 5/2/16**	**Fri 3/3/17**	**Roux**	
37		Completion of SLERA Field Work	5 days	Mon 5/2/16	Fri 5/6/16	Roux	
38	X	Draft SLERA Report	75 days	Mon 11/21/16	Fri 3/3/17	Roux	34
39		**Final Phase 1 Data Summary Report and SLERA Report**	**55 days**	**Mon 3/6/17**	**Fri 5/19/17**	**Roux**	
40		EPA review of Draft Phase I Data Summary Report	35 days	Mon 3/6/17	Fri 4/21/17	EPA	35
41		EPA review of Draft SLERA Report	35 days	Mon 3/6/17	Fri 4/21/17	EPA	38
42	X	Final Phase I Summary Report	20 days	Mon 4/24/17	Fri 5/19/17	Roux	40
43	X	Final SLERA Report	20 days	Mon 4/24/17	Fri 5/19/17	Roux	41



Scheduled Task | Task Progress Complete | Summary

2018-003543-0560

APPENDIX B

Landfill GPR Report

COLUMBIA FALLS ALUMINUM COMPANY

COLUMBIA FALLS, MONTANA

GROUND PENETRATION RADAR SURVEY – LANDFILL SUMMARY REPORT

AUGUST 2016

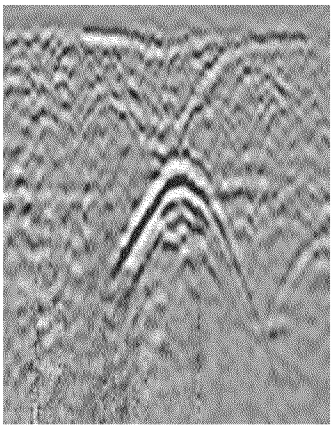
Contact:

Roux Associates, Inc.
Michael Ritorto, Senior Hydrologist
209 Shafter Street
Islandia, New York 11749
631-630-2370

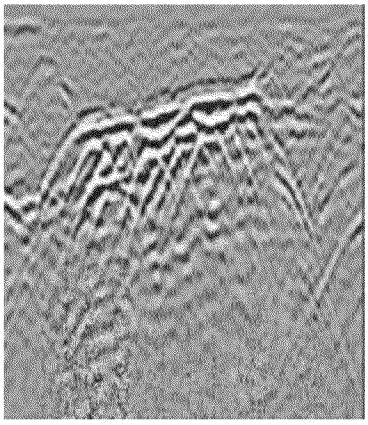
Scope of Work: Roux Associates requested the services of Shari A. Johnson & Associates Engineering to perform a Ground Penetration Radar (GPR) survey within the landfill areas. The objective of the GPR survey was to evaluate the potential of existing cap construction, if present, for each landfill site. GPR survey work was conducted the week of July 25th, 2016.

Ground Penetration Radar (GPR):
The GPR equipment utilized is manufactured by US Radar. The 250MHz antennae was selected for this job site based on the vertical depth of survey requested. The GPR signal was transmitted downward thru the landfill layers where then it was either absorbed, transmitted thru, or reflected back to the GPR receiver. The intensity of the returned signal created a graphical display for the operator as shown on Sheets 2 thru 6.

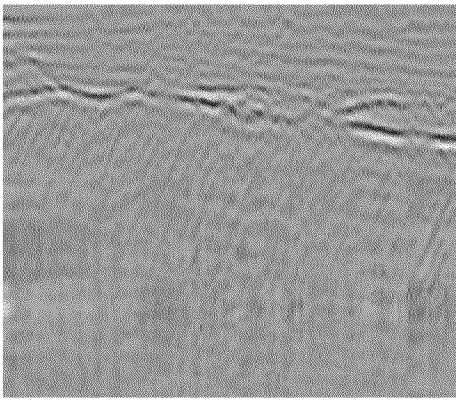
A GPR return signal velocity is determined by the dielectric constant property of a material. Materials with different dielectric constants create signal returns in a pattern that can be interpreted based on signal clarity, shape, and orientation. The examples below show how a pipe, tank or a compacted surface are graphically represented. Manmade objects in soils normally have abrupt transitions at the edges as shown by the pipe and tank signals. Compacted layers are shown by strong horizontal layers different in reflective strength from the immediately adjacent material.



A. Pipe or Cylinder signal



B. Concrete tank on a slope



C. Old compacted buried road profile

In addition to the shape, whether the GPR signal can penetrate a material is also meaningful. Materials with high dielectric constants will receive and disperse the signal without a return. Saturated clays and water limit the signal from reaching greater depths. The dialectic constant table below can help for insight into the landfill results.

Air	1	Sand	4-6
Water (fresh)	81	Gravel	4-7
Ice	4	Clay	25-40
Asphalt	4-8	Silt	16-30
Concrete	8-10	Silty sand	7-10
Crushed base	6-8	Insulation board	2-2.5

Note: Moisture can significantly increase K° (e.g. for gravel it may go from 5 to above 20 as w increases).

Site Survey:

The GPR survey was conducted to a depth of eight feet and results are shown from west to east with the exception of the East Landfill which was conducted roughly north to south. Sheet 1 shows the transect directions and labels corresponding to the data on Sheets 2 thru 6. The horizontal and vertical axis are distance along the transect and depth below surface, both in units of feet. On longer transects, a match line was used to show the connectivity of the split display.

The equipment uses a survey wheel which is calibrated for accurate horizontal measurements. The vertical axis is relative to the type of materials the radar signal is penetrating. Because the landfill materials are non-homogeneous and a field calibration to a known feature was not possible, a precise vertical depth of the features is not known. It is reasonable from equipment technology and experience to extrapolate that the depths are within a magnitude of +/- eight inches. Setting for signal gain and calibration were kept consistent to allow for comparison between the transects.

West Landfill - Sheet 2: A clear consistent horizontal signal layer was seen at approximately 1 ½ to 2 feet deep for the majority of the distance along the north and south transects. There was also an intermittent lighter horizontal signal approximately 1 foot below the stronger signal. Since the light signal is not an exact mirror of the top signal it is likely another layer. Interestingly, the layers both taper to the surface on either end of the transects for the north and south transect lines.

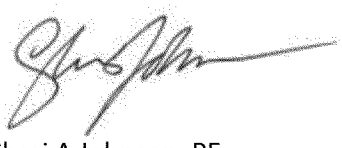
Wet Scrubber Sludge Pond - Sheet 3: Strong layered signals were recorded on the west portion of the landfill about 1 foot deep. Random signal return was visible beneath this layer. On the east side of both transects there were strong reflections that become less organized horizontally which typically means there is a lack of a defined and consistently compacted layer.

Sanitary Landfill - Sheet 4: This landfill area showed random object reflection with the exception of the north transect where a layered signal shows for approximately 50 feet starting at approximately 150 feet from the west edge.

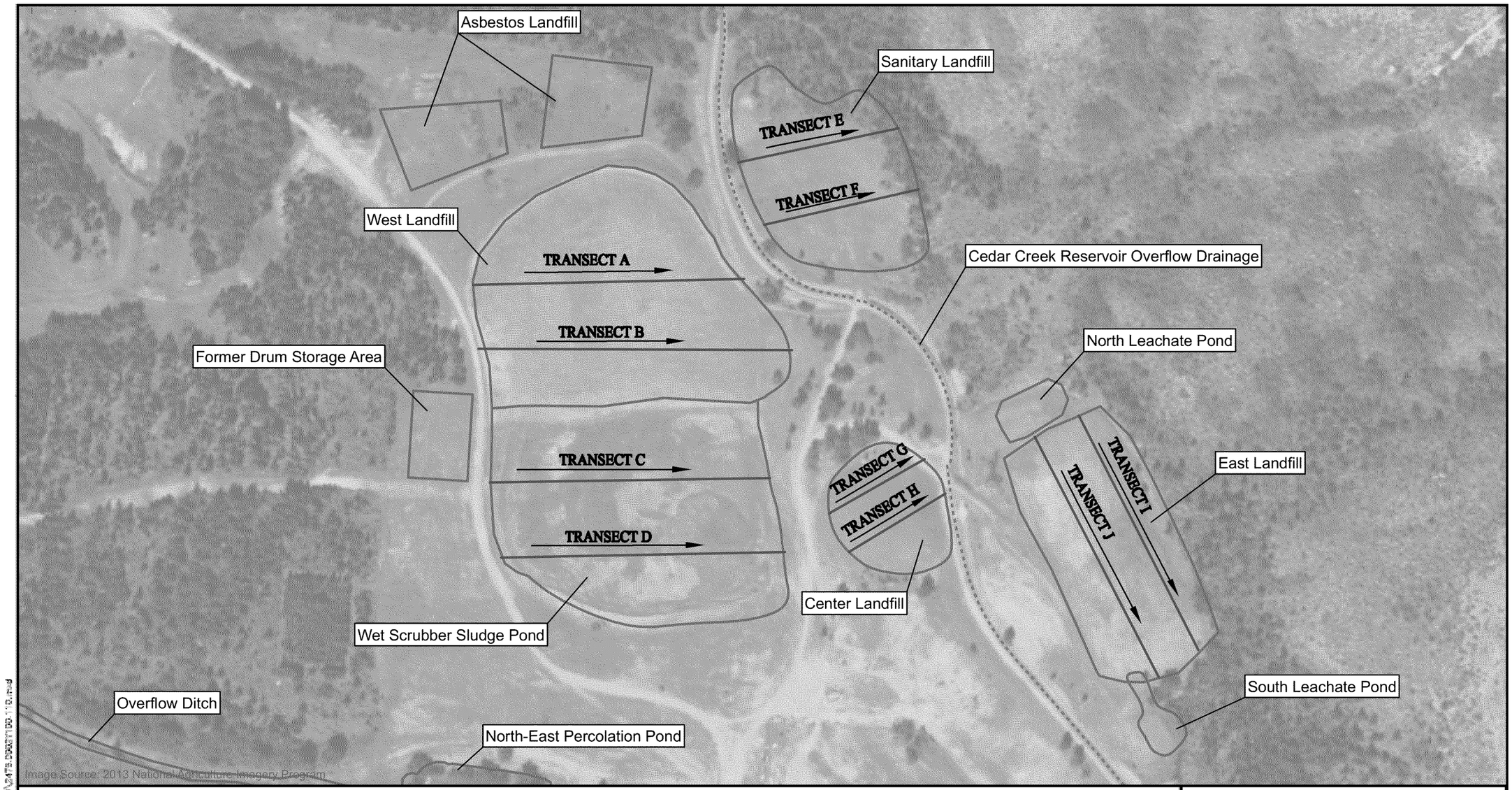
Center Landfill - Sheet 5: The Center Landfill GPR survey data shows broken layers that vary in depth. The signal is not as strong as the top layer data for the West Landfill data nor the East Landfill layer. The western edge of the data for the first 30 feet of Transect G and the first 100 feet of Transect H is typical of native soil signatures.

East Landfill - Sheet 6: A very strong signal layer is shown at approximately 2-feet in depth. Above the layer the GPR picked up a signal from the soil consistent with a small to medium granular material. In contrast, there is little to no signal coming from below the layer. This is different from the other landfills where even below strong layering there was signal return of varying degrees.

Prepared on August 12, 2016 by:



Shari A Johnson, PE
MT License No. 13782



Legend

Proposed GPR Transect

Site Features

250 0 250 Feet

Title:

PROPOSED GPR LANDFILL TRANSECTS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY

Compiled by: A.M.	Date: 10/27/16	FIGURE 10
Prepared by: A.M.	Scale: 1" = 250'	
Project Mgr: A.R.	Project: 2476.3001/1002	
File: 2476.3001\fig10.mxd		

Date 9/16/16
Designed
Revisions

GROUND PENETRATION RADAR BY:
DEEP DTECT SERVICES, LLC

ROUX ASSOCIATES, INC
CFAC - GROUND PENETRATION RADAR SURVEY

TRANSECT LEGEND

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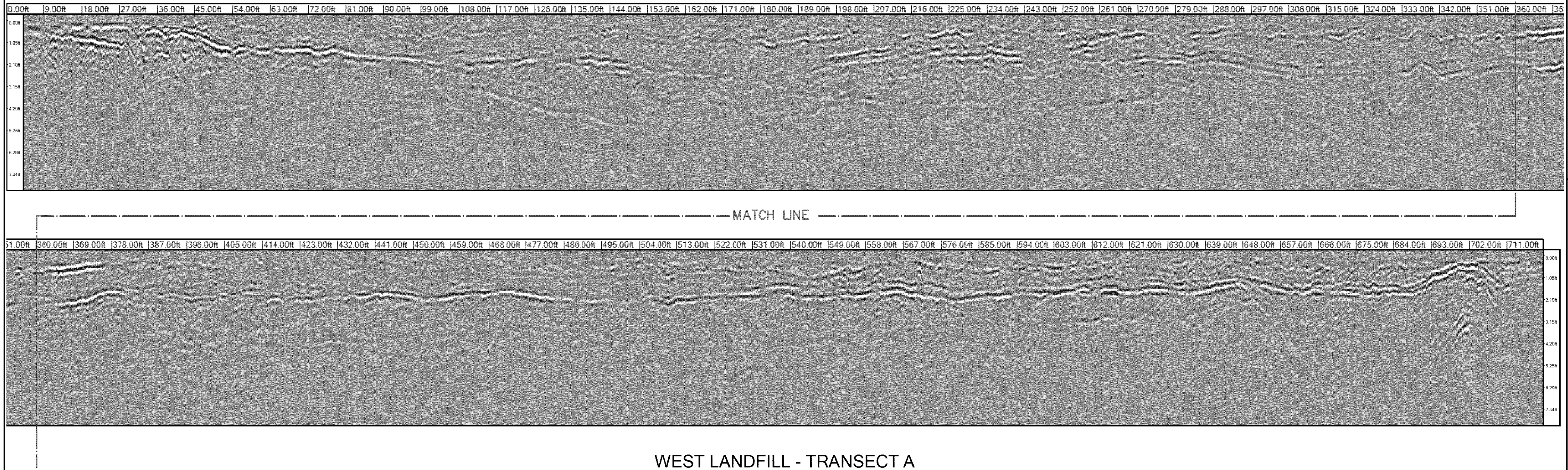
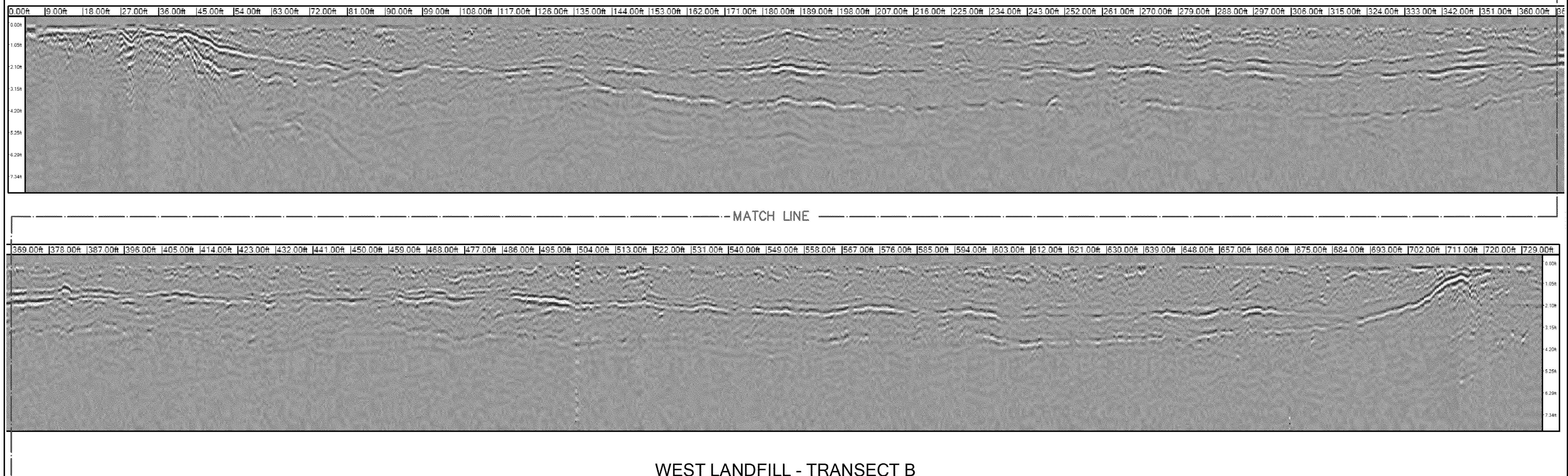
sajengineering@centurylink.net
406-261-3019

Sheet Number:
1
of 6



WEST LANDFILL - TRANSECT A



WEST LANDFILL - TRANSECT B

Date 8/10/16

Designed

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GROUND PENETRATION RADAR BY:

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WEST LANDFILL

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Sheet Number:

2

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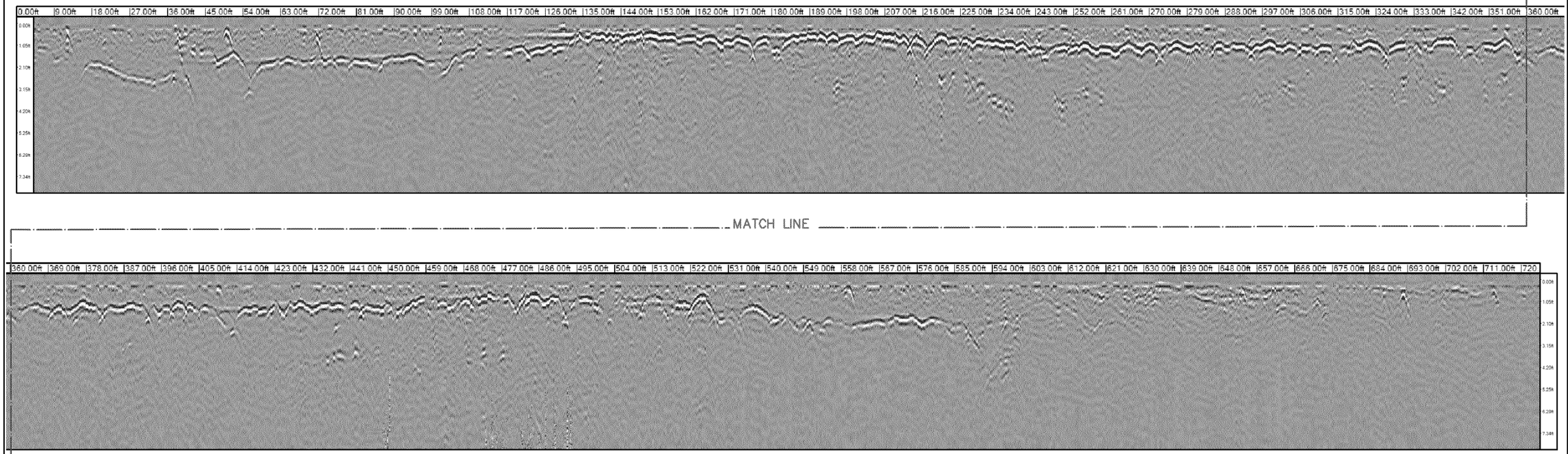
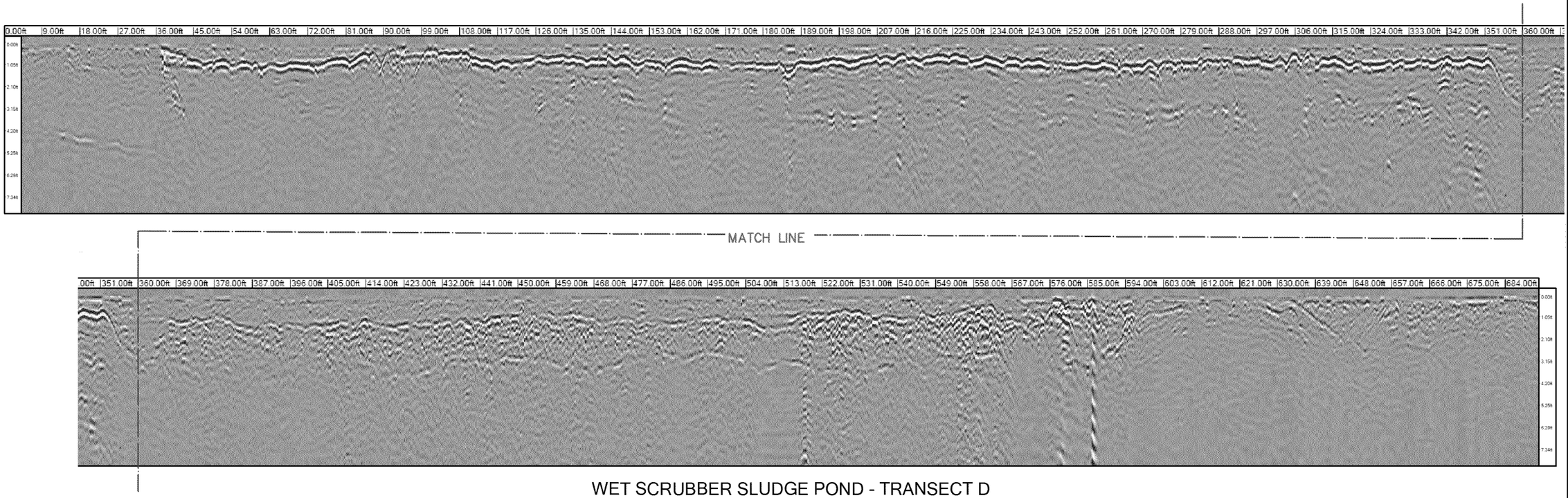


WET SCRUBBER SLUDGE POND - TRANSECT C



WET SCRUBBER SLUDGE POND - TRANSECT D

Date
9/19/16
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GROUND PENETRATION RADAR BY:
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ROUX ASSOCIATES, INC
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WET SCRUBBER SLUDGE POND

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PLLC

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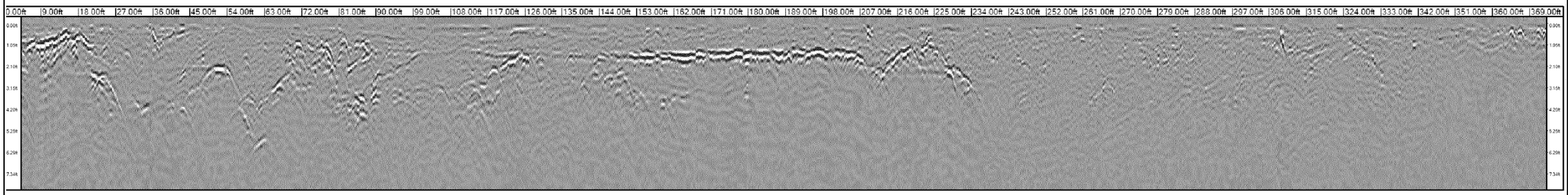
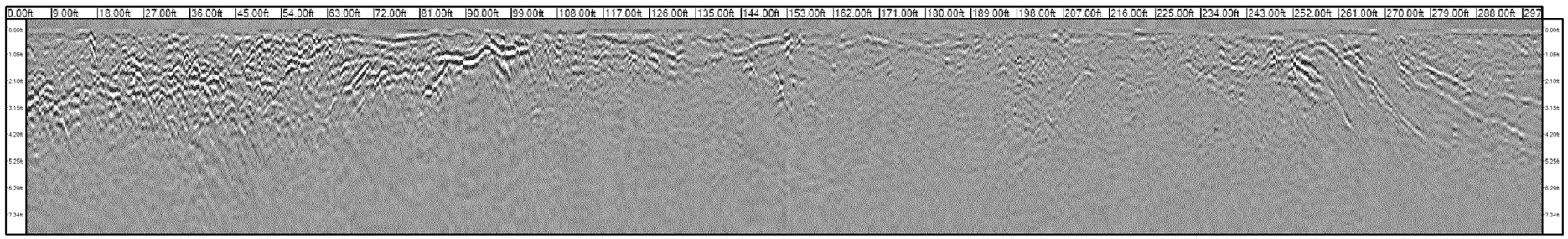
406-261-3019

Sheet Number:
3
of 6



SANITARY LANDFILL - TRANSECT E



SANITARY LANDFILL - TRANSECT F

Date
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SANITARY LANDFILL

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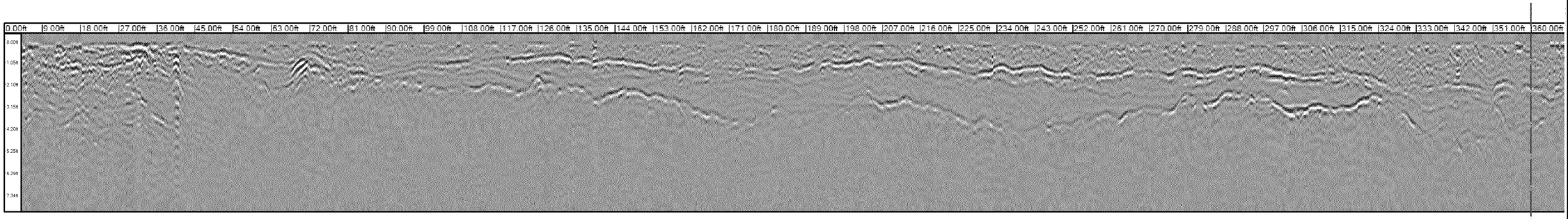
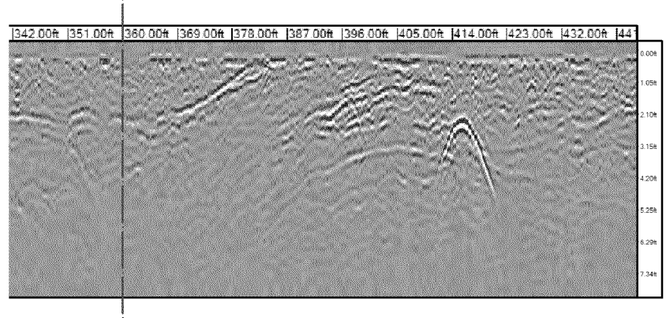
Sheet Number:
4

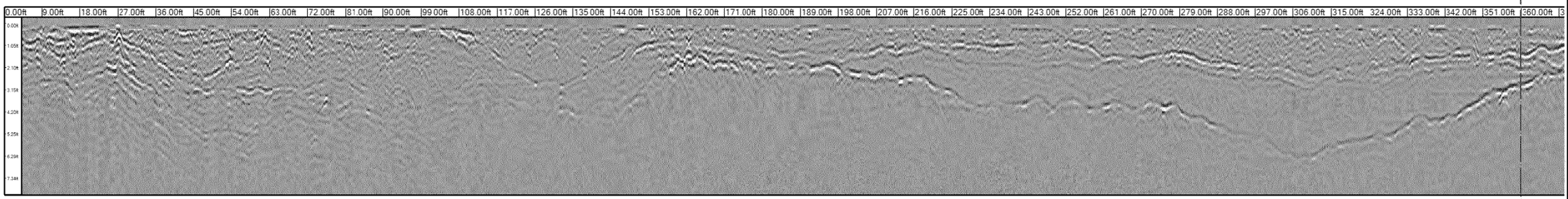
2018-003543-0560

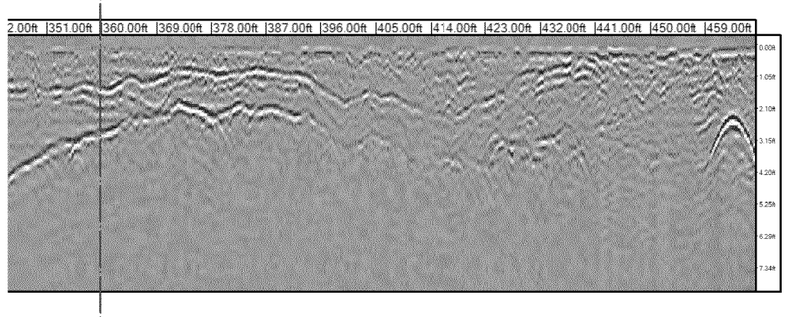




MATCH LINE

CENTER LANDFILL - TRANSECT G





MATCH LINE

CENTER LANDFILL - TRANSECT H

Date: 8/16/16

Designed:

Revisions:

GROUND PENETRATION RADAR BY:

DEEP DTECT SERVICES, LLC

ROUX ASSOCIATES, INC

CFAC - GROUND PENETRATION RADAR SURVEY

CENTER LANDFILL

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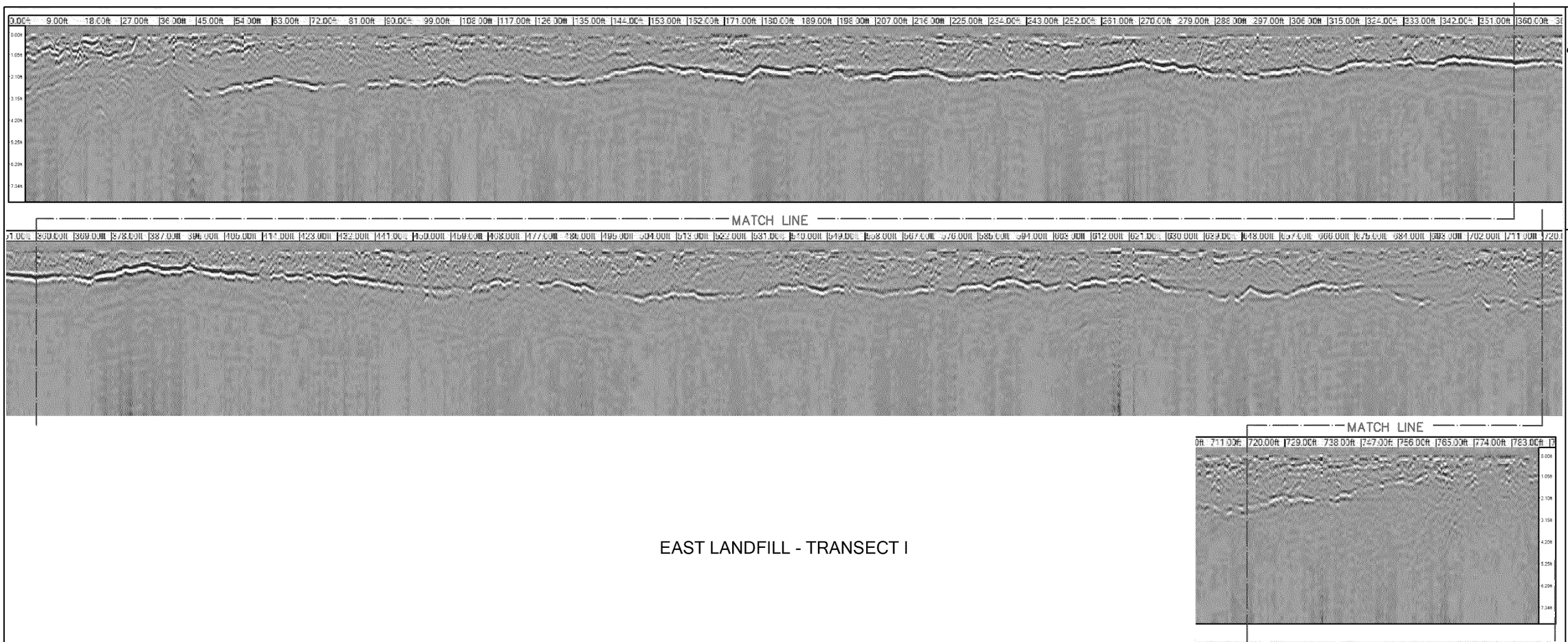
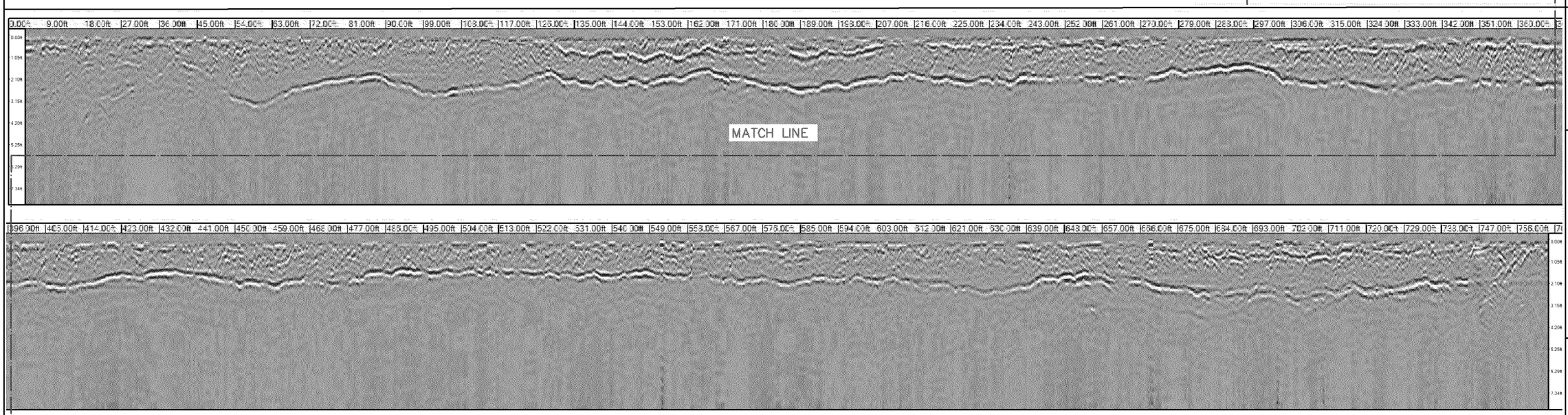
Sheet Number:

5

2018-003543-0560



EAST LANDFILL - TRANSECT I



EAST LANDFILL - TRANSECT J

Date
9/19/16
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GROUND PENETRATION RADAR BY:
DEEP DTECT SERVICES, LLC

ROUX ASSOCIATES, INC
CFAC - GROUND PENETRATION RADAR SURVEY

EAST LANDFILL

SHARI A. JOHNSON & ASSOCIATES ENGINEERING PLLC
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406-261-3019

Sheet Number:
6
of 6

PLATES

Groundwater Contour Map – August 30, 2016

N

LEGEND

	RI/FS SITE BOUNDARY
	SURFACE WATER FEATURE
	SITE FEATURE
CFMW-035	LOCATION AND DESIGNATION OF WATER TABLE MONITORING WELL
CFMW-052	LOCATION AND DESIGNATION OF FORMER PRODUCTION WELL
CFMW-032s*	LOCATION AND DESIGNATION OF DEEP MONITORING WELL
SG-1	LOCATION AND DESIGNATION OF SURFACE WATER STAFF GAUGE
3071.06	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
NM	NOT MEASURED
*	NOT USED IN CONTOURING
3080	CONTOUR LINE OF EQUAL GROUNDWATER ELEVATION (DASHED WHERE INFERRED)
	INFERRED GROUNDWATER FLOW DIRECTION

NOTE

MONITORING WELLS INSTALLED DEEP ARE NOT USED IN CONTOURING.

500' 0 500'

Title:

WATER-TABLE ELEVATION CONTOUR MAP AUGUST 30, 2016

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 02SEPT16	PLATE
Prepared by: G.M.	Scale: AS SHOWN	
Project Mgr: M.R.	Project: 2476.0001Y002	1
File: 2476.0001Y145.01.DWG		

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